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Topographical optimisation of single-storey non-domestic steel framed buildings using photovoltaic panels for zero carbon impact

Sha, W. (2014). *Topographical optimisation of single-storey non-domestic steel framed buildings using photovoltaic panels for zero carbon impact*. Paper presented at ECCS European Steel Construction Day & Annual Meeting, Naples, Italy. <http://www.steelconstruct.com/site/>

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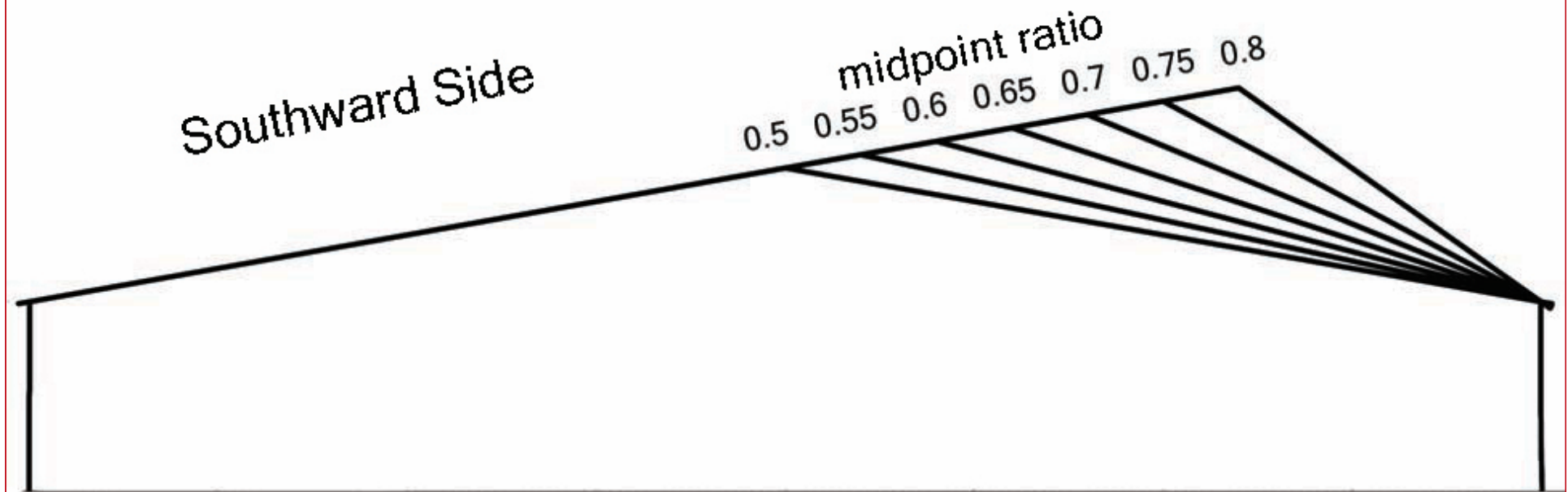
Topographical optimisation of single-storey non-domestic steel framed buildings using photovoltaic panels for zero carbon impact

Wei Sha

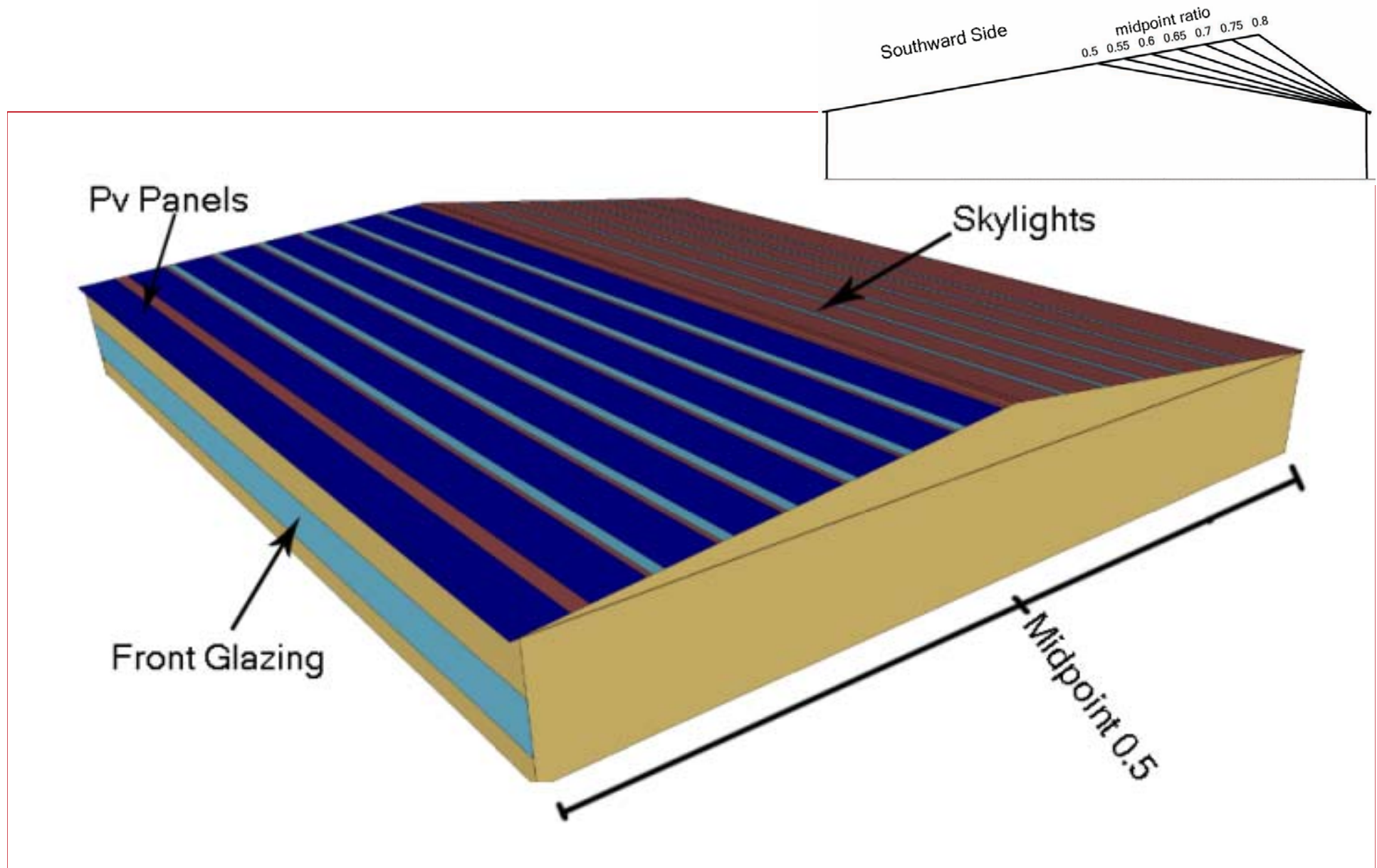
School of Planning, Architecture and Civil Engineering
Queen's University Belfast

Topographic effect of the midpoint ratio

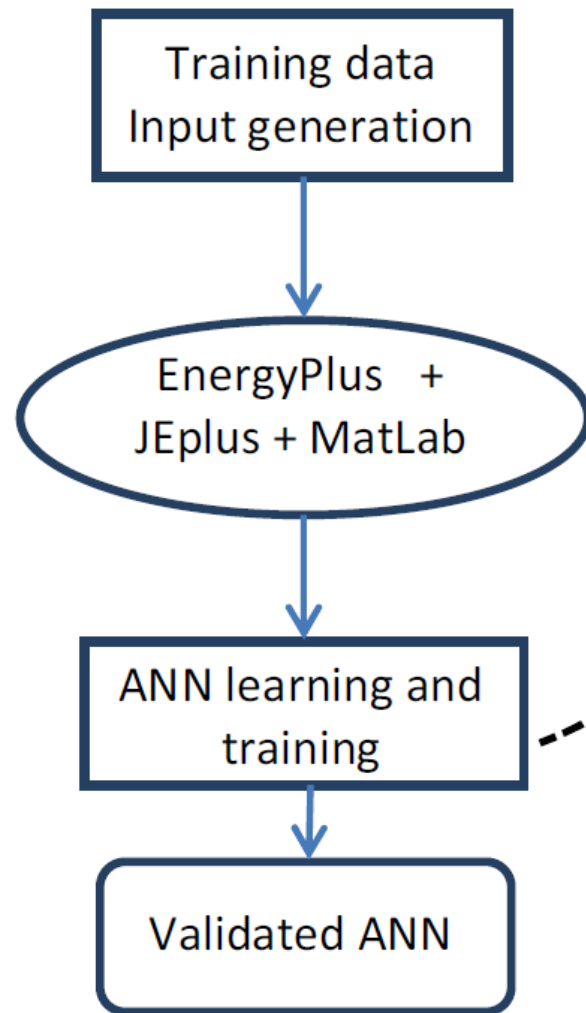
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 16°C 12°C	 17°C 12°C	 17°C 12°C	 16°C 13°C	 16°C 12°C



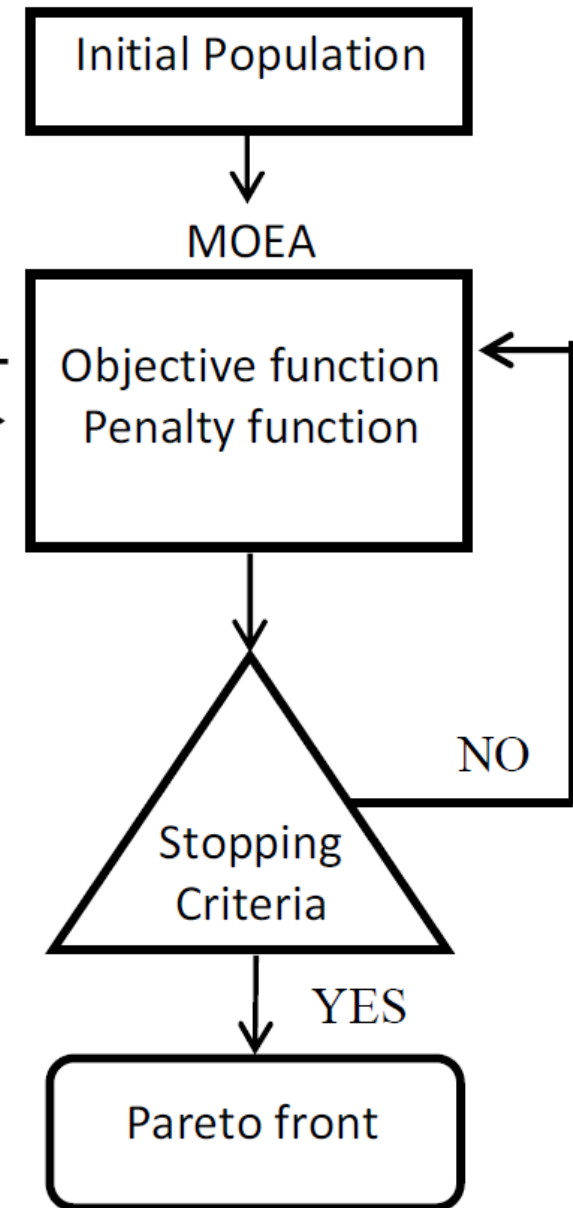
EnergyPlus simulation model representation

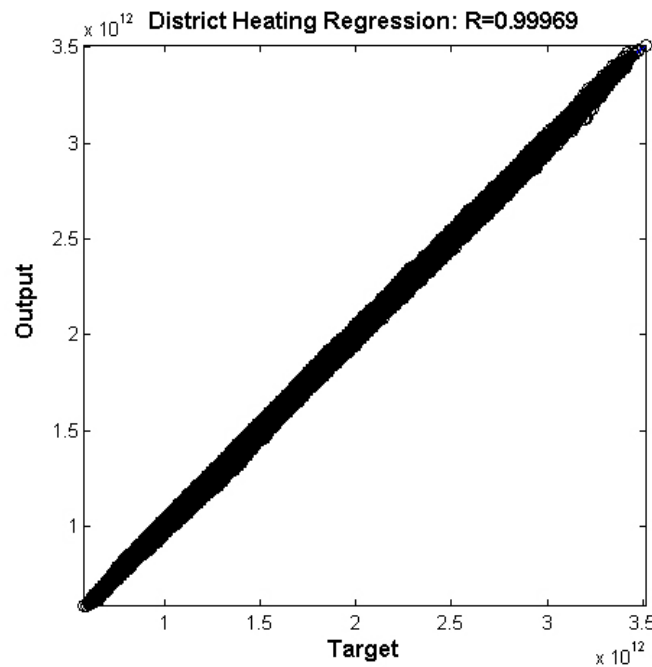
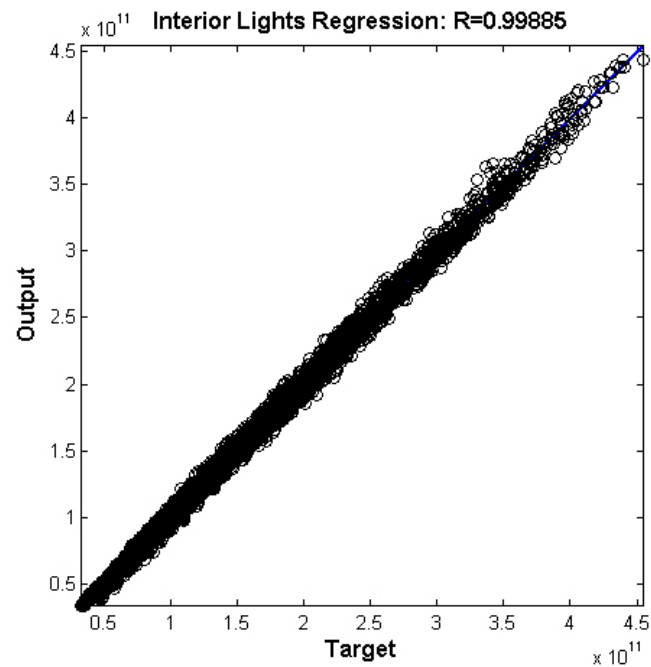


ANN Learning

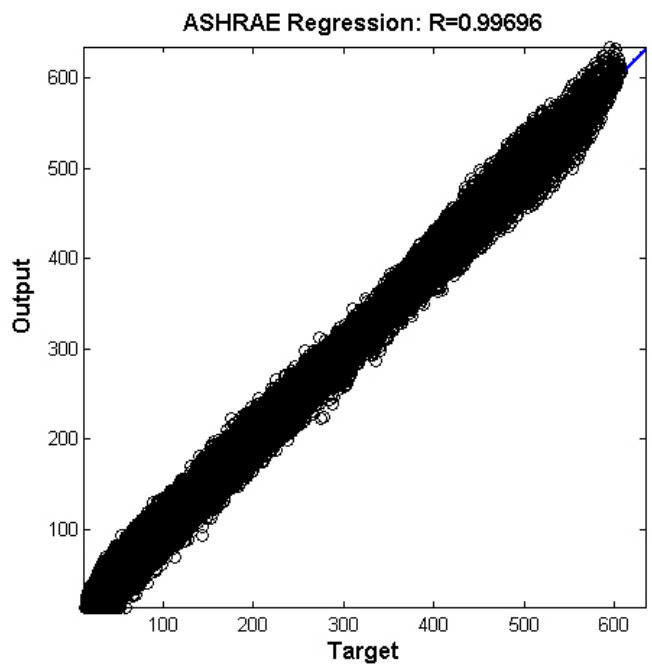
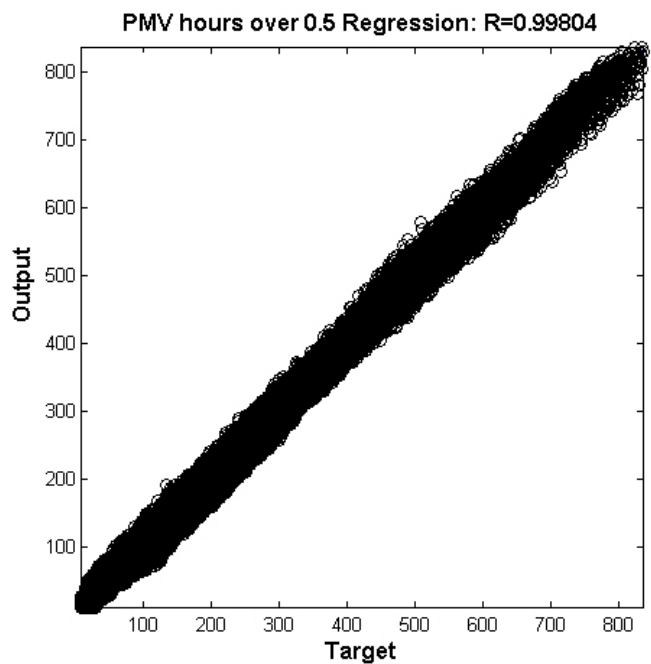


MOEA Optimization





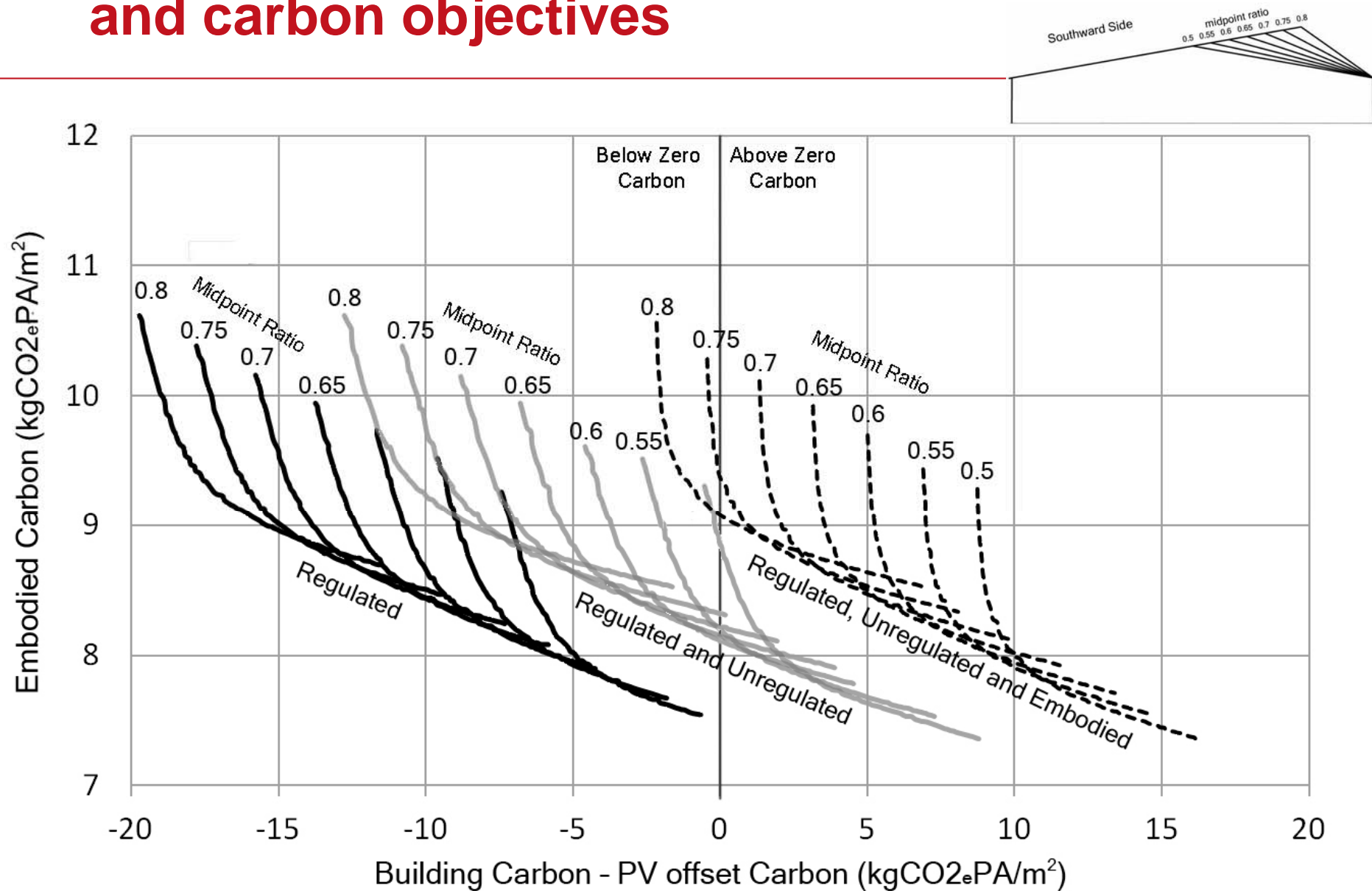
District heating:
a system for
distributing heat
generated in a
centralized
location.



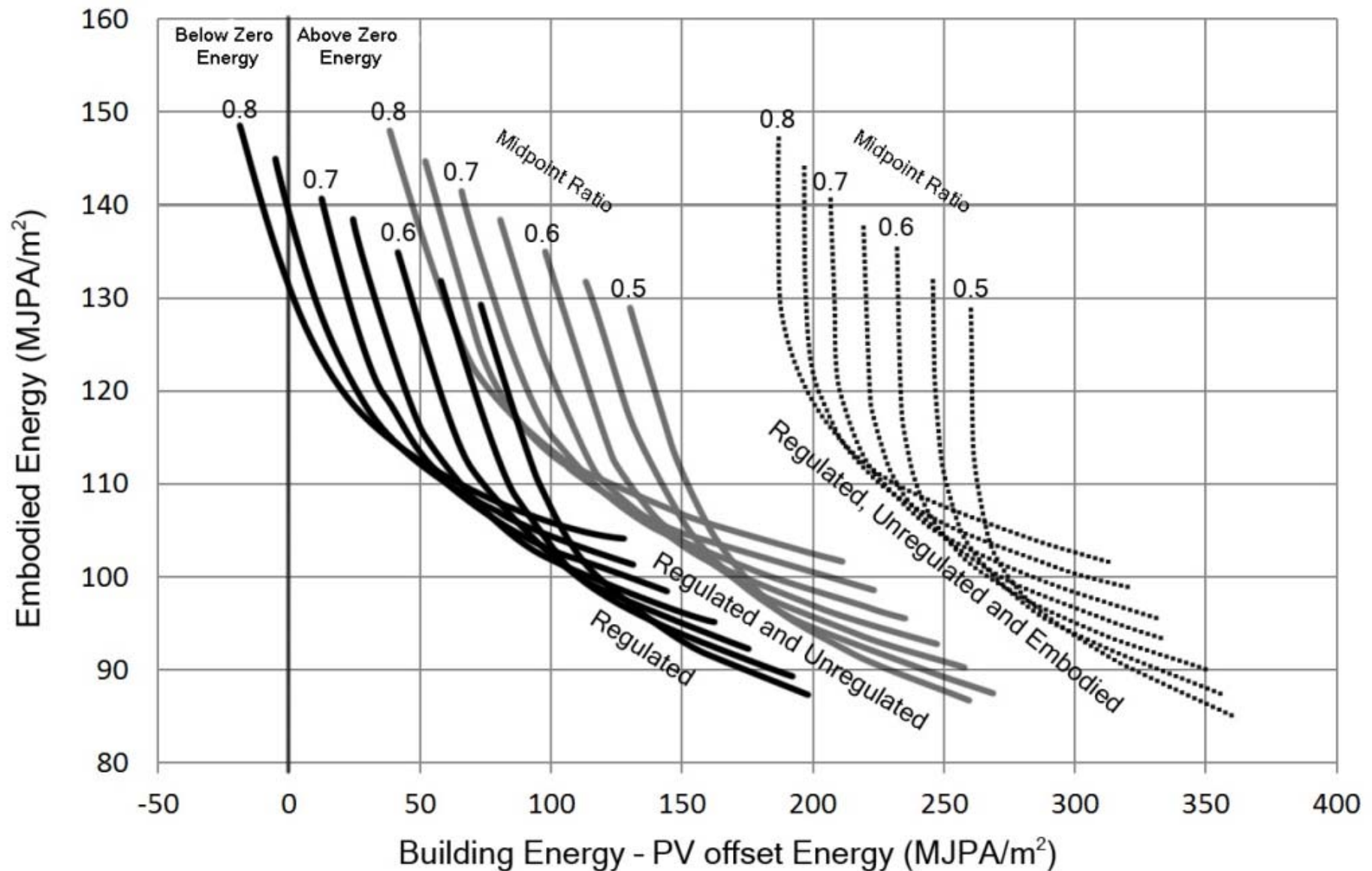
PMV (predicted
mean vote): an
index of thermal
comfort.

ASHRAE:
counting the
number of
hours
discomfort.

Pareto-optimal curves for different midpoint and carbon objectives



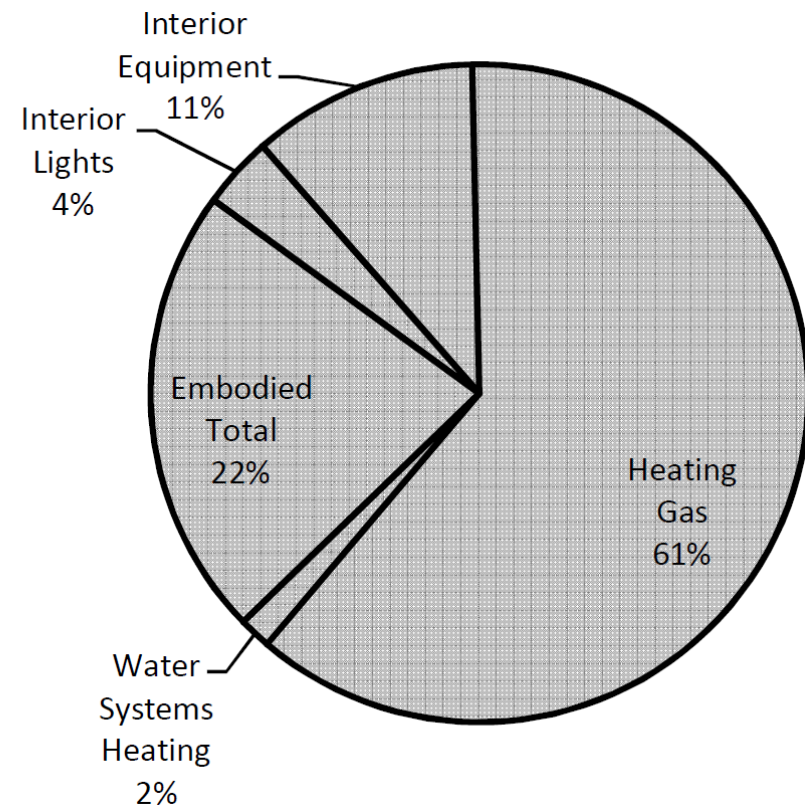
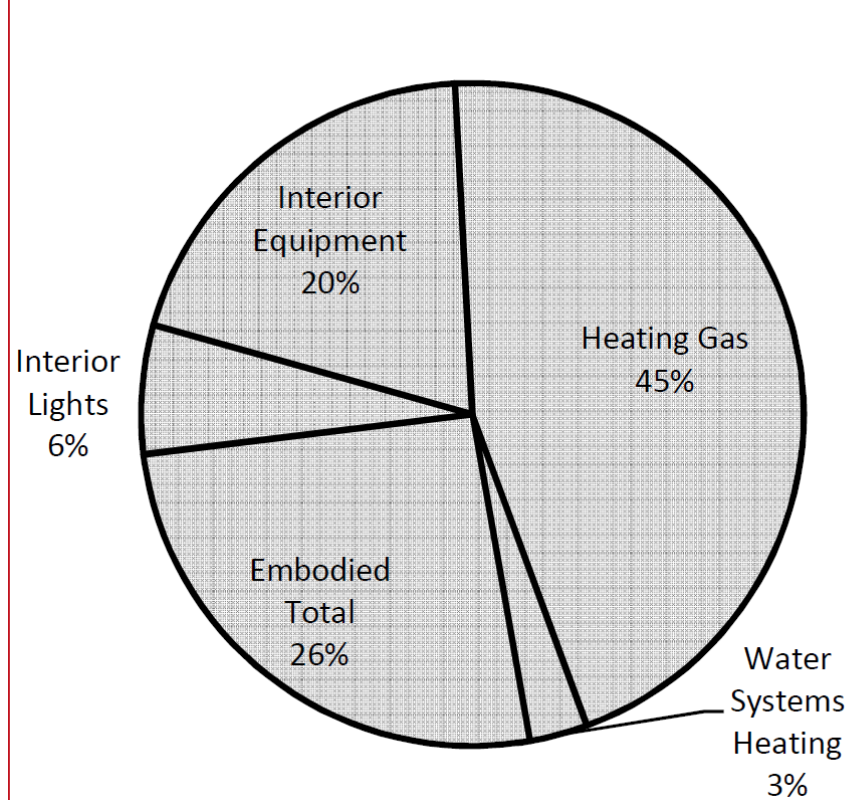
Energy equivalent of the carbon Pareto-optimal curves



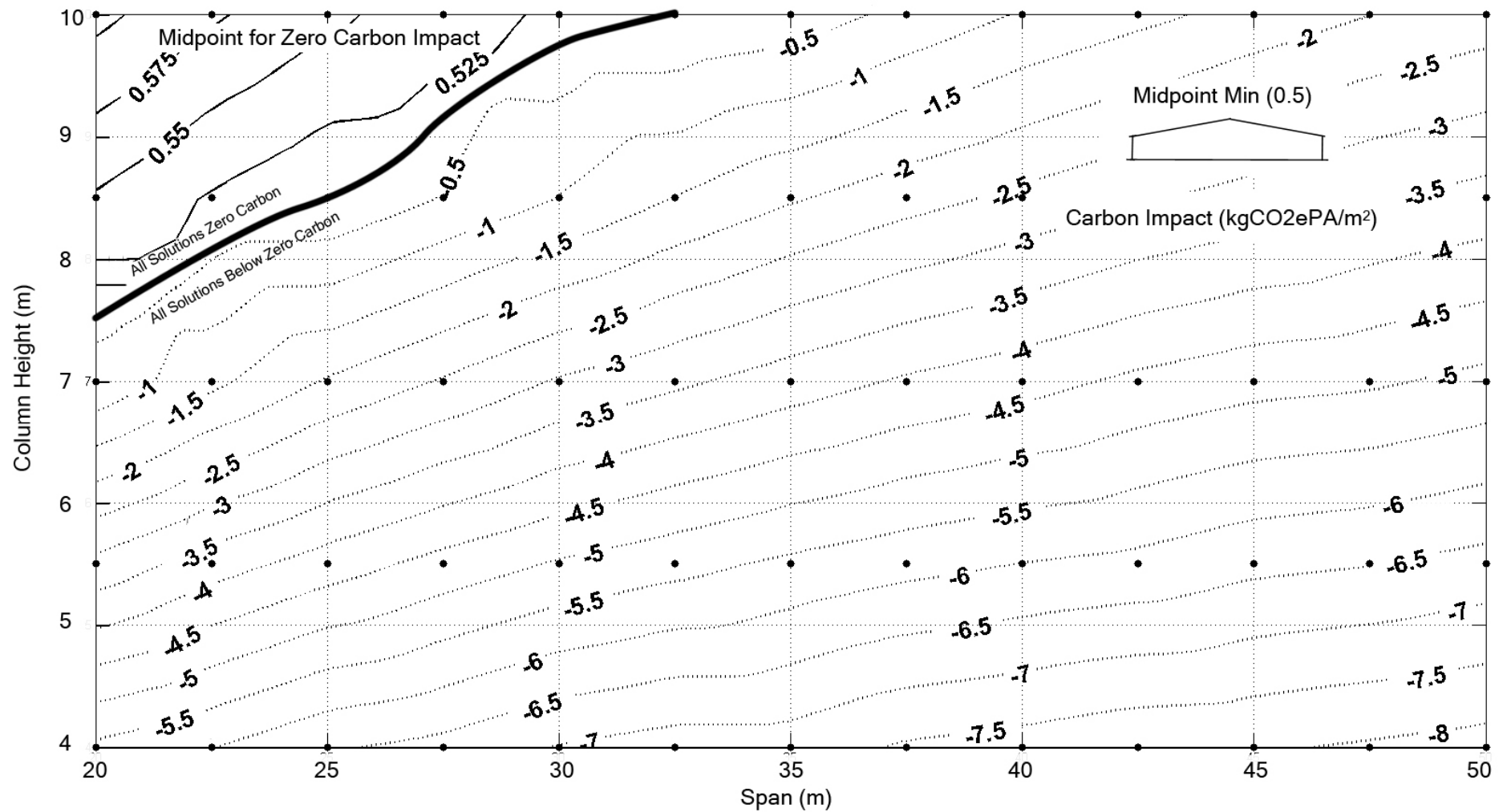
Life time (30 year) breakdown

Embodied Carbon

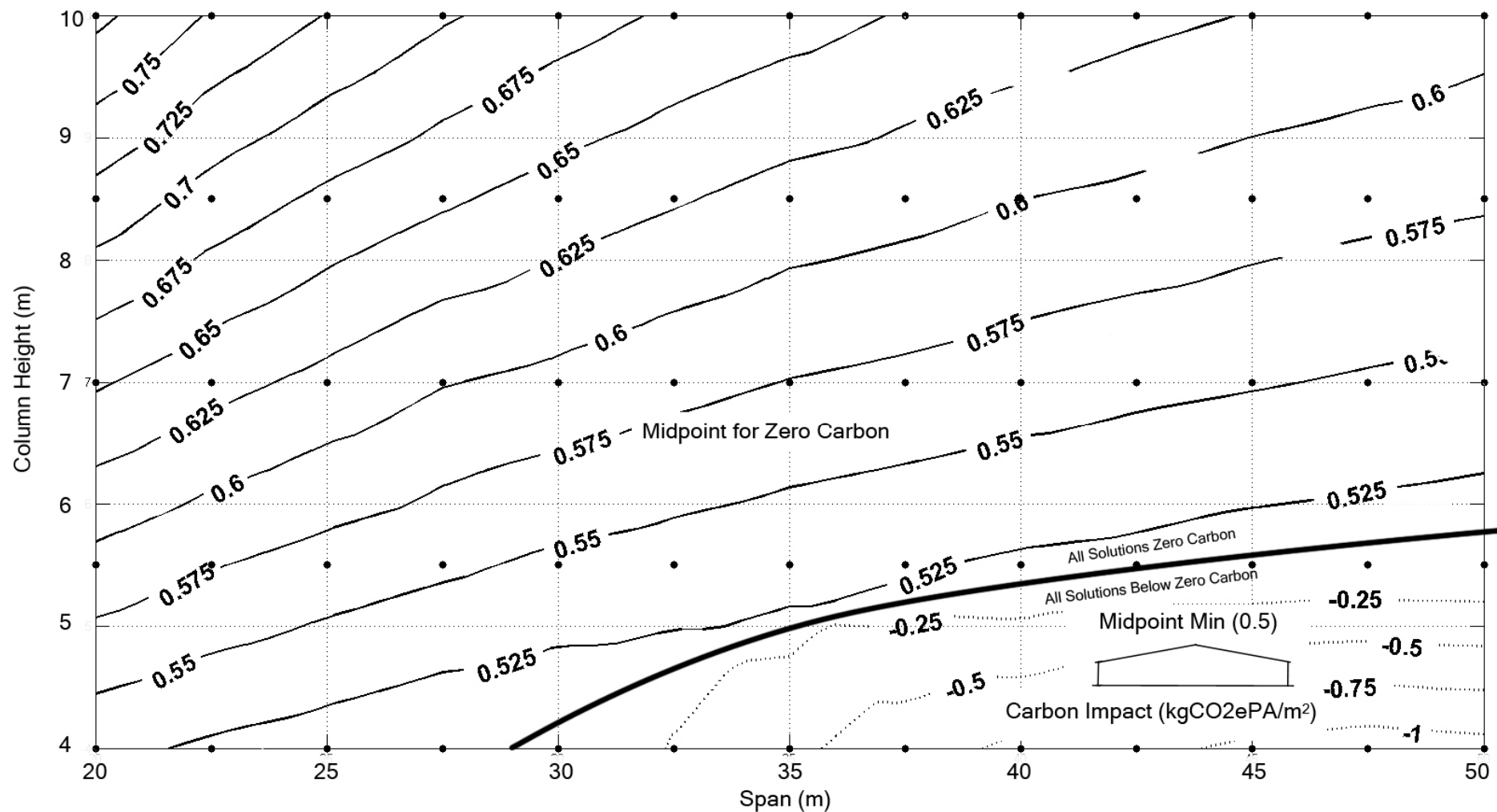
Embodied Energy



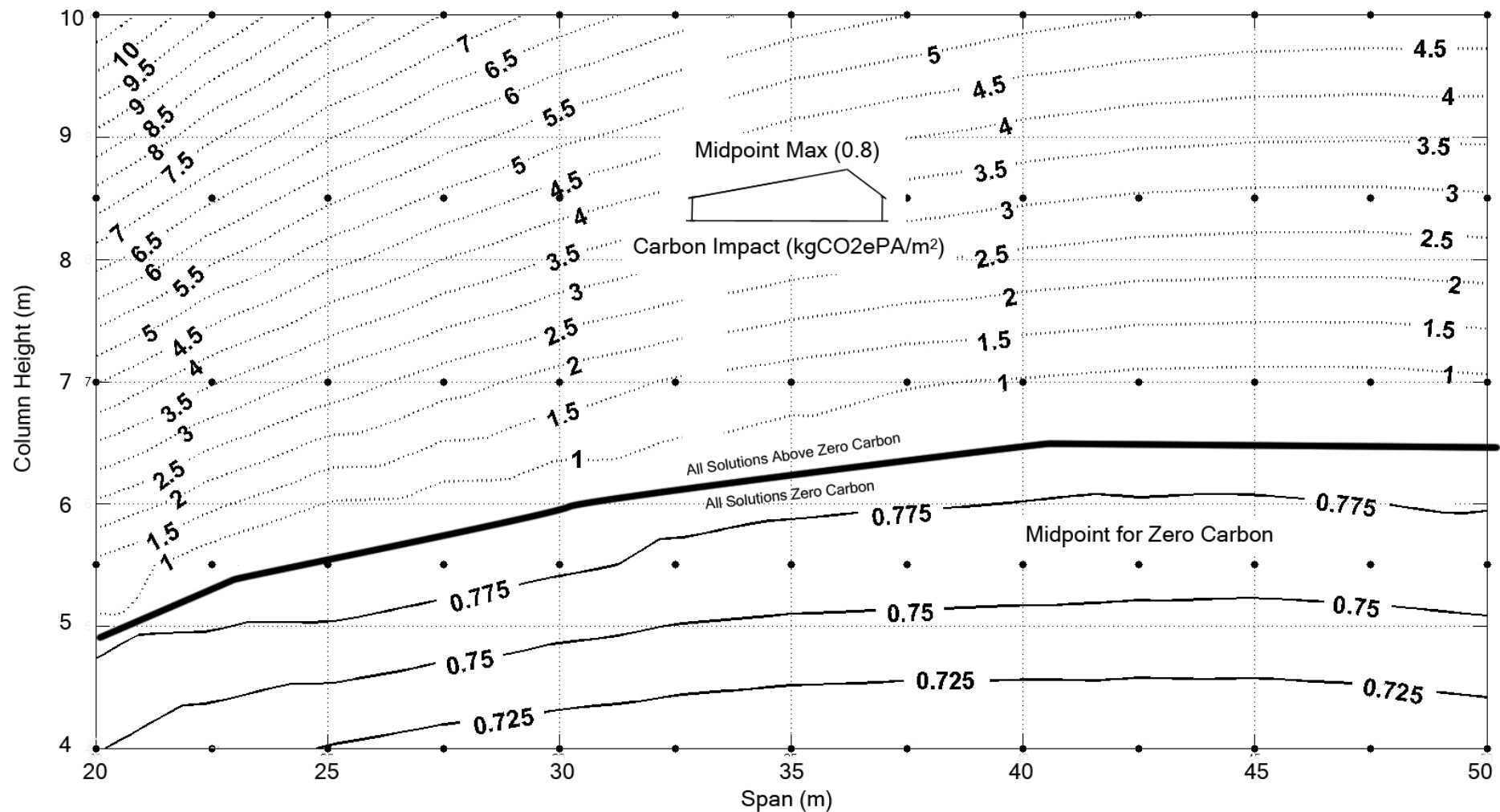
Option 1: regulated carbon offsetting



Option 2: regulated and unregulated carbon offsetting



Option 3: regulated unregulated and embodied carbon offsetting



Acknowledgements



- Ross McKinstray
- James Lim, University of Auckland
- Tiku Tanyimboh, University of Strathclyde
- Duoc Phan, Universiti Tunku Abdul Rahman, Malaysia
- Sandy Brownlee, University of Stirling

Manuscript under review by *Building and Environment*